

## TUNNEL STUDY

### 45) TITLE: On-Road Measurement of Fine Particles, NOX, and Volatile Hydrocarbons from Light- and Heavy-Duty Vehicles

**PROBLEM:** Motor vehicles are a significant source of hydrocarbon, oxides of nitrogen (NOX) and fine particle emissions. The rates and relative profiles of these emissions have likely been impacted by recent changes in fuels and vehicle technologies; in particular, phase three reformulated gasoline and new diesel engine emission control technologies. Of primary concern are changes in total NOX (and ratio of NO: NO<sub>2</sub>), total particulate matter (PM)(and organic and elemental carbon contributions), and volatile organic compounds.

**PREVIOUS WORK:** Quantifying emissions from motor vehicles during on-road operation is relatively rare compared to laboratory-based studies because of the increased complexity of on-road studies. Tunnel investigations have provided a reliable technique for measuring light- and heavy-duty emissions during real-world operation. The most recent effort to quantify fine particulate, NOX and volatile hydrocarbon emissions from California light- and heavy-duty vehicles occurred in 1997 (Kirchstetter, T.W.; Harley, R.A.; Kreisberg, N.M.; Stolzenburg, M.R.; Hering, S.V. *Atmos. Environ.* **33**, 2955, 1999).

**OBJECTIVE:** The objective is to measure the emissions of a broad range of pollutants – fine particulate, NOX, and volatile hydrocarbons - from both light- and heavy-duty motor vehicles during real-world operation.

**DESCRIPTION:** In collaboration with the Bay Area Air Quality Management District, measurement of NO, NO<sub>2</sub>, CO, volatile hydrocarbons (speciated), fine particles (mass, elemental and organic carbon, black carbon), and CO<sub>2</sub> will be performed at the Caldecott Tunnel to determine emission factors for both light-duty and heavy-duty vehicles. These measurements will occur while vehicles are headed up a 4 percent grade through the tunnel, with engine loads similar to typical freeway driving. The study is planned for two sets of weeklong measurements in the summers of 2006 and 2007.

**BENEFITS:** This study is intended to quantify the efficacy of past efforts to control emissions of pollutants as well as provide a baseline to understand the benefits of future efforts such as ultra-low sulfur diesel fuel and diesel particulate traps. In addition, results can be used to refine motor vehicle emission inventories.